EMERGENCY ISSUE Price 6d.

THE ENGINEER

JULY 17, 1959 28 ESSEX ST., STRAND, LONDON, W.C.2 VOL. 208 No. 5399

PUBLIC APPOINTMENTS

THE MANCHESTER COLLEGE OF SCIENCE AND TECHNOLOGY
(Faculty of Technology in the University of Manchester)

RESEARCH ASSISTANT

Applications are invited for the post of Special Research Assistant in the Department of Structural Engineering. Candidates should hold a good degree in Engineering or Mathematics and have at least one Year's research experience, preferably including programming for electronic digital computers. The person appointed will be required to prepare programmes for the Mercury computer at Manchester University Computing Laboratory as part of a research project which is being undertaken into structural problems with the support of D.S.I.R. The position is tenable for three years and salary will be determined by qualifications and experience subject to a maximum of £720 per annum. The post will be superannuable under the F.S.S.U.

Applications, giving details of experience and the names of two referees, should be addressed to the Registrar, The Manchester College of Science and Technology, Manchester 1, by 31st July, 1959. E6860

PORT OF GREENOCK
ASSISTANT GENERAL MANAGER

Applications are invited for the post of Assistant General Manager to the Greenock Harbour Trust. The appointment will run until the retirement of the present General Manager and Engineer in November 1960 when the appointee will be considered for promotion as may then be decided. Candidates should already have administrative experience, and engineering qualifications, while not essential, may be of advantage. The immediate salary offered is not less than £1500 according to qualifications; a contributory superannuation scheme is in operation in conjunction with the Local Authority. Occupancy of a house is available for a General Manager.

Ten copies of applications with full particulars of age, qualifications and experience and the names and addresses of not less than two referees should be forwarded before 31st August 1959 in a cover marked "Assistant General Manager" to the Chairman, Greenock Harbour Trust, Customhouse Quay, Greenock. E.6858.

BRITISH TRANSPORT DOCKS

NEW WORKS ASSISTANT

British Transport Docks invite applications for the position of New Works Assistant in the Docks Engineers Department, Garston Docks.

Applicants should have experience in the design, execution and maintenance of civil Engineering works and knowledge of specifications and quantities. Experience in Dock and Harbour engineering and Associate Membership of the Institution of Civil Engineers desirable. Commencing salary £1,045 per annum, contributory superannuation scheme and certain rail travel facilities.

Applications, giving age, experience and present position, should be forwarded to: Staff & Establishment Officer, British Transport Docks, 163, Euston Road, London, N.W.1., to arrive not later than Friday, 24th July, 1959 E6859

TENDERS

GOVERNMENT OF NEW ZEALAND

MINISTRY OF WORKS

Wairakei Geothermal Project

Tenders will shortly be required for the supply only of one 65 ton overhead electric travelling crane of 75 ft. span for the 'B' Station at Wairakei, New Zealand. Interested firms should apply to Merz & McLellan, Millburn, Esher, Surrey, for further particulars. No further announcement will appear in the press and manufacturers should regard this notice as the formal invitation to tender. E6874

GOVERNMENT OF NEW ZEALAND

MINISTRY OF WORKS

Wairekei Geothermal Project

Tenders will shortly be required for the supply only of equipment for an extension of the circulating water pump house at Wairakei. This will include 4 electric motor driven pumps each of 37,500 g.p.m. at 70 ft. head; a number of 42in. and 48in. valves; 42in. pipework etc. Firms who are interested should apply to Merz and McLellan, Millburn, Esher, Surrey, for further particulars. No further announcement will appear in the press and manufacturers should regard this notice as the formal invitation to tender. E6875

GOVERNMENT OF NEW ZEALAND

MINISTRY OF WORKS

Wairakei Geothermal Project

Tenders will shortly be required for the supply only of three circulating water strainers of 37,500 g.p.m. capacity each. The strainers shall be motor operated under a maximum pressure of 45 feet of water; shall be self-cleaning and shall be arranged for on-load washing. The holes in the strainer plate shall not be greater than ⅜in. diameter.

Interested firms should apply to Merz and McLellan Milburn, Esher, Surrey, for full particulars. No further announcement will appear in the press and manufacturers should regard this notice as the formal invitation to tender. E6876

TENDERS

THE COMMISSIONERS FOR THE PORT OF CALCUTTA

TENDER FOR DREDGING AT BALARI BAR RIVER HOOGHLY

Tenders are invited from suitable contractors for dredging and disposal works at Balari Bar, River Hooghly. The approximate total quantity of material to be removed is 8 million cu. yds.

Drawings, Conditions of Contract and Specification may be obtained from either the Chief Engineer, Commissioners for the Port of Calcutta, 15 Strand Road, Calcutta, India, upon payment of a tender fee of Rs. 20/- or from the Commissioners' Consulting Engineers and London Agents, Messrs. Rendel, Palmer & Tritton, 125 Victoria Street, Westminster, S.W.1. upon payment of a fee of £1 10s. 0d. Such tender fee will not be refundable.

Applications from Agents or other intermediaries will not be considered.

Tenderers are required, before submitting their tenders, to deposit as Earnest Money Rs10,000/- or £750 sterling and a receipt for this amount must accompany the tender. Such Earnest Money shall be returned to unsuccessful tenderers on application.

Tenders shall be submitted in triplicate in sealed covers superscribed "Tender for dredging and disposal work at Balari Bar"; one copy to Messrs. Rendel, Palmer & Tritton at 125 Victoria Street, Westminster, London, S.W.1., so as to reach them not later than 10.30 hours G.M.T. on 17th August, 1959 and two copies to the Chief Engineer, Commissioners for the Port of Calcutta, 15, Strand Road, Calcutta, India, by 16.00 hours I.S.T. on the same date.

The Commissioners do not bind themselves to accept the lowest tender, and reserve the right to reject a tender without assigning any reasons.

T. M. MALKANI
Chief Engineer,
Calcutta Port Commissioners.

15 Strand Road,
Calcutta, India. E8674.

EDUCATIONAL

A.M.I.MECH.E., B.Sc., City and Guilds, &c. Guarantee Postal Courses for all Exams. and Technical Divisions from Elementary to Degree standard including Automation Techniques. Approximately 95 per cent successes. 148-page prospectus free on request.—B.I.E.T. (Dept. 22), 29, Wright's Lane, London, W.8. E114 E

ELECTRONICS, covering practical and theoretical aspects, basic principles, Industrial applications, electronic apparatus, &c. Guaranteed coaching for Brit.I.R.E., City and Guilds, &c. Study at home under highly qualified tutors.—Write for free book: International Correspondence Schools, 71, Kingsway (Dept. 446A), London, W.C.2. E157 E

SITUATIONS VACANT

APPLICANTS ARE ADVISED TO SEND COPIES NOT ORIGINALS, OF THEIR TESTIMONIALS UNLESS OTHERWISE REQUESTED.

A.E.I. JOHN THOMPSON

NUCLEAR ENERGY COMPANY LIMITED
RADBROKE HALL, KNUTSFORD, CHESHIRE

Applications are invited from: MECHANICAL and ELECTRICAL ENGINEERS for senior and junior positions in a group co-ordinating the design of complete nuclear power stations. Candidates should have a degree or equivalent qualifications and experience of power station work will be an advantage.

The Company provides transport from the Stretford, Sale and Altrincham areas; and there are first class dining facilities. A contributory pension scheme is in operation.

Application should be made to the Chief Engineer, quoting ref: GEA/JCT.

AN INSTRUMENT ENGINEER is needed by a well known firm of CHEMICAL PLANT DESIGNERS AND CONSTRUCTORS situated near MANCHESTER. Experience, ability and capacity for work are more important than formal qualifications but technical education should be adequate to enable prescription of instrumentation to suit processes, initiation of detailed design, procurement and erection and follow on with testing and commissioning. A generous salary will be paid. Please include in your application full background details, salary expected and when available and address these to C.E., Box No. E6829 "The Engineer".

ASSISTANT TO CHIEF ENGINEER required.—Preference given to those applicants having knowledge of pressure vessels. Salary £1,000 p.a. and upwards. Contributory Pension Scheme Apply in writing in the first instance to the Secretary, Burgess Products & Co. Ltd., P.O. Box 11 Hinkley, Leicestershire. E6871

AVELING-BARFORD, LIMITED require a Methods Engineer for their Grantham Works.

Applicants must be under the age of 45 years and experienced in time and motion study. The successful applicant will be required to administer a Methods Department whose object is the effecting of a continuous reduction in product costs starting from the original designs.

Salary £1100 0s. 0d. per annum. Good Pension Scheme after probationary period. All replies will be treated with strictest confidence.

Apply: Personnel Manager, Aveling-Barford, Limited, Grantham. E6867

SITUATIONS VACANT

ARCHITECTURAL DESIGNER with experience in the preparation of designs and specifications for building and civil engineering work covering industrial and office buildings, including site surveys.

Required to join a team of designers for initiating development work at a large steel works near Sheffield.

Superannuation scheme in operation.

Applicants to state age, education and training qualifications, present and past appointments with types of work undertaken, and give indication of salary expected.

Applications should be addressed to the Chief Engineer, Samuel Fox and Company Limited, Stocksbridge Works, nr. Sheffield. E6861

CHIEF PROJECT OFFICER
required by

the United Kingdom Atomic Energy Authority at Aldermaston. To co-ordinate the efforts of a number of divisions, each specialising in a different field of science or engineering. The successful candidate will be responsible, with the help of a small staff, for ensuring that important development projects for the Services meet agreed target dates.

Considerable experience of co-ordinating major wide-based research and development projects is required and previous experience in guided weapon or similar large scale military projects would be an advantage. Possession of Good Honours degree in Engineering or Science or Corporate Membership of a senior Professional Institution is essential.

Salary:—This is a senior appointment and salary will be commensurate with responsibility up to a maximum of £3,500.

Contributory Superannuation Scheme. A modern house with garage or substantial assistance with house purchase will become available for married officers living beyond daily travelling distance.

POSTCARDS for application forms to the SENIOR RECRUITMENT OFFICER at ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON, BERKS. Please quote ref. 2311/25. E6873

DESIGNER—ESTIMATOR required by well established firm of sewage pump manufacturers in the Midlands. Applicants must give details of experience, age and salary required. Box No. E2477, "The Engineer".

DESIGNER DRAUGHTSMAN (MECHANICAL) required by prominent Civil Engineering Contractors for newly established

RESEARCH DEPARTMENT
situated in S.W. Hertfordshire

H.N.C. or equivalent qualifications, and experience in original design required. Applications, which will be treated with strict confidence, quoting reference G.20 to Box E6866, "The Engineer".

DESIGN ENGINEER

An old established Engineering Company in the West of Scotland, specialising in general and hydraulic engineering, invites applications from men over 30 years of age for a senior appointment on their Design staff.

This appointment carries responsibility for the conception and development of irrigation and hydro-electric gate work. The job demands a high degree of technical ability and engineering experience, combined with a flair for original design. A knowledge of up-to-date fabrication methods would be an advantage.

A salary commensurate with ability and experience will be paid for the post; a contributory pension and life assurance scheme is in operation.

All applications, with details of experience and salary expected, should be sent to the Managing Director, Glenfield & Kennedy Ltd., Kilmarnock, and will be treated in the strictest confidence. E6872

DRAUGHTSMEN

OUR £1,000,000 MODERNISATION PROGRAMME offers stimulating and permanent opportunities to those with a minimum of 3 years shop floor experience, 2 years in a drawing office, and an O.N.C. We will welcome applications from those with better qualifications and experience in machine and detailed design work and plant layout. In addition to good conditions of employment, these posts will provide the satisfaction which comes to members of a small team who are in at the beginning of a comprehensive reconstruction programme. Send details of age, education, experience and present salary to:

PERSONNEL MANAGER
CROWN CORK CO. LTD.
SOUTHALL,
MIDDLESEX E6884

ENGINEER—qualified minimum O.N.C. or equivalent with experience of machinery maintenance, rigging and heavy lifting, required for key post as Operator/Supervisor in charge of large lorry mounted crane and crew. Able to undertake lifting work of all kinds in all locations, on own initiative. This is responsible work involving long hours and considerable travelling, and is suitably remunerated. Training in operation will be given. Box No. E6886, "The Engineer".

ELECTRICAL ENGINEER required for work on design and development of industrial servo motors and associated components. Previous experience in this field desirable. Higher National Certificate or equivalent qualifications essential. Salary according to age and experience. Opportunity for promotion where ability and initiative is shown. Write giving full details to Personnel Manager, Evershed & Vignoles Ltd., Acton Lane Works, Chiswick, W.4. E6870

SITUATIONS VACANT

MECHANICAL AND ELECTRICAL ENGINEERS
Henry Wiggin & Company Limited,
Holmer Road, Hereford.
require
A QUALIFIED MECHANICAL ENGINEER
and
A QUALIFIED ELECTRICAL ENGINEER
AS ENGINEERING ASSISTANTS

for interesting and varied work, in the first place in connection with their Expansion and Modernisation Scheme at Hereford.

Applicants should be under 40 years of age and possess either an Engineering Degree or Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers. They should have had a first-class practical training and engineering experience, covering preferably, one or more of the following:

Steelworks Plant and Equipment.
Extrusion Plant and Machinery.
Heavy Hydraulic Equipment.
Rolling Mills and Ancillary Equipment.

Attractive salaries will be paid to the successful applicants.

Excellent Welfare and Canteen facilities will be available and a generous Non-Contributory Retirement Scheme is in operation.

Apply in writing, giving full particulars of education, training and experience, to the Chief Engineer.

HENRY WIGGIN & COMPANY, LIMITED
HOLMER ROAD, HEREFORD.
E6834

METHODS ENGINEER, ELECTRICAL required for established Diesel Manufacturing Company in East Anglia. Applicants should be fully qualified Electrical Engineer with first class knowledge of modern electrical equipment and test and procedures. Ability and personality to organise and take full responsibility for test problems and liaison with electrical manufacturers on technical problems is essential. Good salary will be paid to the suitable applicant. Applications in writing, stating age, qualifications and experience to Personnel Manager, Box ME.891, A.K. Advtg. 212a, Shaftesbury Avenue, London, W.C.2. E.6856

OPERATING ENGINEERS for high pressure water tube boilers required by well known firm of Boiler Contractors. Applicants must have previous experience and be prepared to travel anywhere in the U.K. and abroad. Minimum qualifications B.O.T. Certificate (Steam). Membership Institute of Marine Engineers or H.N.C. an advantage. Salary commensurate with experience and qualifications. Pension scheme. Apply giving full details of age, previous employment and qualifications in confidence to Box No. E.6851 "The Engineer".

PERSONNEL OFFICER

A large heavy engineering and boilermaking Firm in Glasgow, require a fully experienced Personnel Officer, preferably a time served tradesman, not under 30 years of age, with Knowledge of and experience in dealing with:—

(*a*) Engagement of Labour, all classes.
(*b*) Negotiations with workers representatives.
(*c*) Agreements between Employers Associations and Trade Unions on Wages and conditions.
(*d*) Apprentices progress through Works Departments.
(*e*) Works welfare and safety measures.

Please detail experience and positions held also state age and salary required. Write 2361, Wm. Porteous & Co., Glasgow.

E.6840.

QUALIFIED MECHANICAL ENGINEER aged 25/30 required by medium sized General Engineering Works, Bolton area. Knowledge of estimating for castings and production allied to general engineering Knowledge of hydraulic presses, rubber machinery and/or glass machinery an advantage. Salary according to experience and qualifications. Pensions Scheme and commission. Progressive appointment for the right man. Box No. E2479, "The Engineer".

SHELL-MEX AND B P LTD have a vacancy in their Southern Division for a qualified Engineer. The position is based at Southampton and the Division covers most of the South Eastern Counties. Candidates should have had thorough training in workshops and possess either Corporate Membership of the Institutions of Civil or Mechanical Engineers or have passed parts A & B of one of these Institution's examinations (or have qualifications entitling them to exemption from such examinations). Experience on pumps and pipelines or building construction will be advantageous. Excellent Pension Scheme. Starting salary commensurate with qualifications and experience. Apply in writing giving full details of age, qualifications and experience to the Staff Manager, (Ref.D/173), Shell-Mex House, Strand, London, W.C.2. E6862

THE DISTILLERS COMPANY LIMITED

PROJECT ENGINEER

This vacancy occurs in the Chemical Division of The Distillers Company Limited. The minimum qualifications are an H.N.C. (Mechanical Engineering) and some practical engineering experience, but a degree or the professional equivalent in mechanical engineering is desirable. Applicants should be in the age group 25-35. The successful candidate will be concerned with the design, installation and servicing of carbon dioxide equipment supplied to customers, and with giving customer service on technical problems; he will supervise the work of at least five Field Service Engineers.

Write:
STAFF MANAGER,
THE DISTILLERS COMPANY LIMITED,
21 ST. JAMES'S SQUARE,
LONDON, S.W.1.
Quote Ref 67/59E

E688

SITUATIONS VACANT

STRUCTURAL STEELWORK DESIGNER with a good knowledge of light structures as well as conventional steel design required by Consulting Engineers. Five day week. Pension Scheme. Holiday arrangements honoured. Apply stating details of experience and salary required to Alan Marshall & Partners, 73/74 High Holborn, W.C.1. E2476

THE GENERAL ELECTRIC COMPANY LIMITED

ATOMIC ENERGY DIVISION

has vacancies in the Reactor Heat Transfer Section for experimental and theoretical work on performance of fuel elements, and on engineering design studies including fluid dynamics. Extensive laboratory facilities and a "Mercury" digital computer is available.
The following staff are required:—
(a) Senior Graduates with research experience in heat transfer.
(b) Graduates in engineering, physics or applied mathematics.
(c) Mechanical Engineers with the H.N.C.
(d) Laboratory Assistants with O.N.C. or G.C.E.
Apply Personnel Manager (DWB/7), The General Electric Company Limited, Erith, Kent. E6868

YOUNG MEN REQUIRED to train for managerial posts in a progressive steelworks. Preference will be given to applicants holding H.N.C. or equivalent in Metallurgy or Engineering. Previous steelworks experience not essential. Salary will be commensurate with qualifications and experience. These are positions with very good prospects. Staff position, pension and free life assurance schemes, &c. Please apply, stating age, qualifications and experience.—BOX No. E6709, "The Engineer." A

PATENTS

THE PROPRIETORS of British Patent No. 706,933 for "MACHINE TOOLS FOR MACHINING BRAKE DRUMS AND THE LIKE", desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2. E6869

PATENT No. 742409—A Packing or Sealing Ring for Rotating Shafts and the like. The Proprietors o Patent No. 742409 desire to enter into arrangements by way of licence or otherwise on reasonable terms to ensure its full development and commercial working in this country.
Address enquiries to:—
W. P. Thompson & Co.,
Chartered Patent & Trade Mark Agents,
12 Church Street, LIVERPOOL 1. E2478

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REMPLOY SPONSORSHIP SCHEME.—Send for details which show an attractive proposition to manufacturers.—Write to the Managing Director, Remploy, Ltd., 25–28, Buckingham Gate, S.W.1, or telephone VICtoria 6621 (12 lines). E155 o

ADVERTISER, PRIVATE INVESTOR desires to purchase whole or part interest in concern under progressive management making annual net profit of £15/50,000. Box No. E.158, "The Engineer".

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ELECTRICAL PLANT
of all kinds.
AIR COMPRESSORS
DIESEL & STEAM
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E6711 F

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FRED WATKINS (ENGINEERING) LTD.

STEAM BOILERS.—Cochrane Vertical (New), 8ft. 6in., 8ft., 7ft. 6in., 7 ft. and 6ft. in dia. 100/150 lb. w.p.; reconditioned 8ft. 6in. down to 3ft. dia.; Economic 4ft. to 11ft. 6in. dia., including new 7ft. and 8ft. dia., 150, 180 and 200 lb. w.p.; 300 reconditioned Vertical Crosstube, all sizes.
AIR COMPRESSORS.—Two Belliss & Morcom 2500 c.f.m., 100 p.s.i., 550 h.p. motors; also Broomwade 500, 400, 300, 200 and 130 c.f.m., all motorised; and several others of various makes and capacities.
200 AIR RECEIVERS, stocked up to 9ft. dia., 100 to 500 lb. pressure.
ELECTRIC MOTORS.—150 Totally Enclosed and Flameproof Motors up to 200 h.p.
MOBILE ROAD CRANES.—10-ton Lorain lorry mounted 30ft.-70ft. extendible jib; 10-ton 33 R.B track mounted, 40ft. jib; 8½ton Ransomes Diesel/Electric, 21ft. jib; 6-ton Coles Diesel/Electric, pneumatics, new 1948 (2); 6-ton Coles Diesel/Electric, solids; 4-ton Coles Diesel/Electric, solids, 1945; 4-ton Jones KL44, diesel, 1950; 3-ton Jones "Super 40" diesel, pneumatics (3).
OVERHEAD CRANES.—40-ton Babcock, 40ft. span, 400/3/50, "Goliath"; 30/5-ton Adamson, 42ft. 3in. span, 400/3/50; 20/6-ton Vaughan, 42ft. 3in. span, cab type (6); 20-ton King, 42ft. 3in. span, 400/3/50; 15-ton Morris, 35ft. span, hand operated; 10-ton Morris, 45ft. span, 36ft. lift; 10-ton Morris "Goliath", 40ft. span. 400/3/50; 10-ton Vaughan, 23ft. 6in. span, 400/3/50; 10-ton Vaughan, 21ft span, 44ft, lift 7½ tons Wharton, 25ft. span, 400/3/50; 5-ton Henderson, 24ft. 7in. span, 1946; 5-ton Morris, 58ft. span, hand operated; 5-ton Royce, 2-motor crab, 440/3/50; 5-ton King, 29ft. 3 in. span, power hoist, hand travel; 5-ton Morris, 28ft. 6in. span, power hoist, hand travel; 4-ton Morris, 19ft. span, 220V, d.c. (3); 3-ton Adamson, 48ft. span, 400/3/50; 2-ton Adamson, 34ft. span, 400/3/50 (2); 2-ton Morris, 18ft. span; 2-ton Vaughan, 27ft. 6in. span, 2-motor; majority of the above are unused.
DERRICK CRANES.—7-ton Rushworth hand 30ft. jib; 5-ton Wilson Electric 70ft. jib; 5-ton Butters, hand, 45ft. jib; 1½-ton Anderson Grice, hand, 40ft. jib.
RAIL CRANES.—18-ton Brownhoist, steam, 50ft. jib; 10-ton Coles steam 40ft. jib; 10-ton Grafton, 34ft. jib, diesel conversion; 8-ton Wilson steam, 35ft. jib; 5-ton Grafton, 35ft. jib, diesel conversion; 5-ton Smith, 50ft. jib (2); 5-ton Cowans Sheldon, 50ft. jib.
LOCOS.—Fowler diesel, 150 h.p. (2); Ruston diesel, 80/88 h.p., new 1942; Bagnall 14in. by 22in., two oil fired, one coal; Peckett steam, 7in by 12in., 1941; also 3 miles track, 24in. gauge, Bogies, Turnouts, &c.
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CAST IRON PIPES.—Large stocks all sizes up to 24in. flanged and s.s. Immediate delivery.
VALVES.—Exceptional Surplus Ministry Lot, New Stainless Acid Cocks and Valves, over 5000, immediate delivery, below makers' prices. Large stock all sizes, Parallel Slide Sluices, Gunmetal, Reducing and Check Valves. List on request.
STORAGE TANKS.—300 cylindrical and rectangular up to 12,000 gallons, for oil and petrol, also sectional steel and cast iron up to 50,000 gallons.
MACHINE TOOLS.—Scriven Plate Bending Rolls, 14ft. by ¼in.; Robertson Straightening Rolls, 8ft. 6in. by ¼in.; Berry Bending Rolls, 7ft. by ¼in.; Tangye 200-ton Hydraulic Vertical Straightening Press, 15ft. by 3 ft. table; Herbert 3ND Miller, 61in. by 15in. table; Pels Punch and Shears, ¼in. capacity; nine new 2 cwt. and 1 cwt. Pneumatic Hammers; Bliss 14T Tapering Press; Bonn Hydraulic Tube Bender up to 20ft. by 4in. bore; 100 ton Bigwood geared Bending and Straightening Machine up to 12in. by 6in. R.S. Joists; two 40kVA. Spot Welding Machines; Wire Drawing Machine, 3 die up to ¼in. copper; 50kW Electric Furnace 1000 deg. Cent., chamber 54in. by 30in. by 21in.

SLING ENGINEERING WORKS
COLEFORD, GLOS.
'Phone: Coleford 2271/2. E106 G

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Hydraulic Accumulators, Valves, Fittings, New and Second-hand. Complete installations.
All kinds of Hydraulic Equipment in Stock.

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East 1844/5. E111 G

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SERVICE EDWARDS VALUE!

FOR SALE

NEW STOELTING Plate Bending Roller, Pyramid type, with separate motor drive to top pressure roller, motorised for 400/440/3/50, capacity 12ft. by ¼in., length of rolls 10ft. 2¼in., diameter of top rolls 9⅝in., diameter of bottom rolls 7⅜in., rolling speed approx. 16ft. per minute, weight approximately 91 cwt.
WESTON Model 400/100, Double-Sided Friction Screw Press, of welded steel plate construction, arranged motor drive for 400/3/50, pressure exerted approximately 120 tons, maximum stroke 11in., diameter of screw with four starts 6¼in., size of bed 21⅛in. by 18in., weight approximately 5 tons.
CRAIG AND DONALD Model 400/10, All Steel Motorised Double-Geared Press Brake, of steel plate construction, arranged motor drive for 440/3/50, pressure exerted approximately 400 tons, former capacity 10ft. by ¼in., length of top beam and bed 10ft., depth of gap 12in., weight approximately 29 tons.
TWO NEW TYPE MGA6K, Motorised Geared Scrap Shearing Machines, mounted on steel fabricated four-wheel truck for portable use, suitable for cropping round or square bars, sheet metal, armoured cable and all types of scrap metal, arranged motor drive for 400/440/3/50.
QUICKWORK No. 321, Motorised Rotary Shearing Machine, with circle cutting attachment, capacity 14 S.W.G. mild steel, depth of shear throat 30in., cuts circles from 6in. to 60in. diameter.
RUSHWORTH Power-Operated Double-Geared Open-Ended Guillotine Shearing Machine, overcrank type, arranged motor drive for 380/440/3/50, capacity mild steel 4ft. by ¼in., weight approximately 50 cwt.
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Photographs of the above are available. Very favourable Hire Purchase terms can be obtained.
MACHINE TOOLS, NEW AND USED,
Of Every Description. Attractive Prices.

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Telephone: EUSton 4681-3771,
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LANSDOWNE HOUSE, 41, WATER STREET
BIRMINGHAM, 3.
Telephone: Central 7606-8. E207 G

FRED WATKINS (ENGINEERING) LTD.

800-ton Fielding Vertical 4-column Downstroke Hydraulic Press, ram 23in. dia. by 14in. stroke, Daylight 2ft. 3in., Platens 5ft. 4in. by 4ft. 4in., with 2 pumps and controls, motorised 400/3/50.
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Fielding 200-ton ditto, 3ft. stroke, with pumps and motors (5 available).
Fielding 100-ton ditto, 4ft. to 5ft. stroke, with pumps and motors.
Two 73ft. 4in. by 5ft. Kilns or Dryers, with Crofts Reduction Gear and 27 h.p. motor.
Two 26ft. by 4ft. Rotary Cooler or Dryers, with reduction gear and motor.
Available at low prices ex present sites to save cost of bringing into stock.

FRED WATKINS (ENGINEERING), LTD.
COLEFORD, GLOS. E151 G

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FRORIEP 54in. Heavy Duty Vertical TURNING AND BORING MILLS, fitted with side head; main motor 50-h.p. New 1952. In first class condition.

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EUSton 4681 and 3771

600

Overhead Travelling Crane 5-ton capacity by Anderson-Grice, double lattice girder, 3-motor, for 400/3/50 electric supply, arranged for cab control. 48-ft. span, 21-ft. height of lift. Will Allen West controls. Supplied new in 1944.

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Wood Lane, London, W.12
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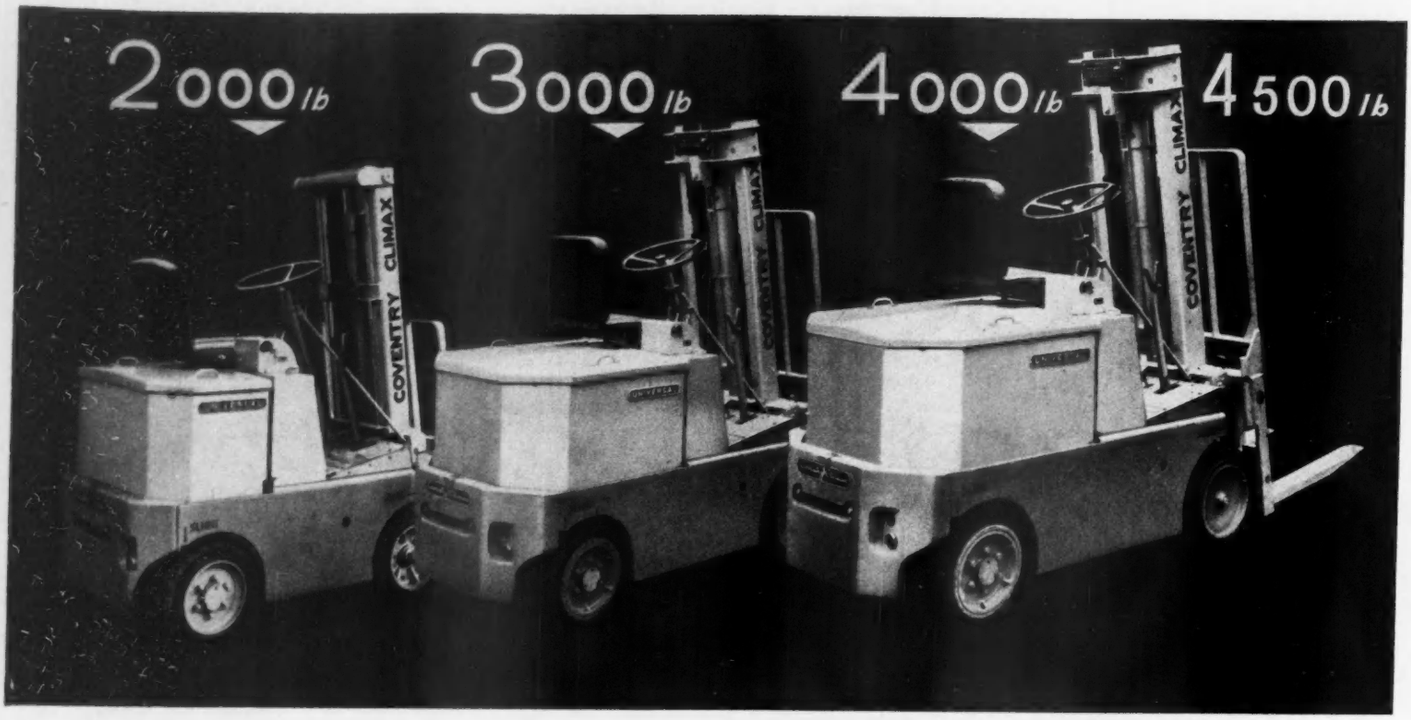

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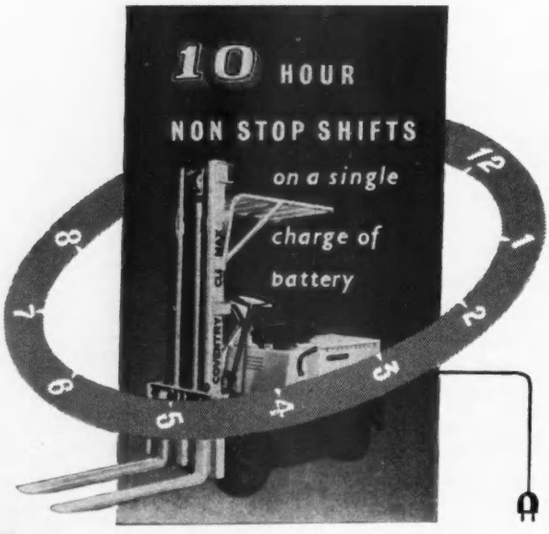

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THE ENGINEER

No. 5399 JULY 17, 1959 VOL. 208

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"MECHANICALS" IN SWITZERLAND

About a fortnight ago—we are not able to be more precise as we cannot be sure, under existing circumstances, exactly when this article will appear in print—members of the Institution of Mechanical Engineers came back to this country after holding a Summer Meeting in Switzerland between Monday evening, June 29 and Friday evening, July 3. It was only the second time since the war that the Institution had taken its members abroad. We think and hope the Institution will be encouraged to organise meetings on the Continent more often. For we met no one in Switzerland who did not seem to regard the whole affair as an unqualified success; and that despite the fact that for the whole of the first two days it scarcely ever stopped raining. In fact the weather was so bad that a rumour was current on Wednesday evening that a coach load of members attempting an excursion over the Susten Pass had become stuck in a snowstorm and needed the services of a snowplough to get them out! However, just at the time, on the Thursday, when members in general started to make visits farther afield than Zurich and its surroundings, the sun came out, the clouds cleared away, and far off, southwards, over the Zurich Lake, snow-capped mountains could be seen.

Two impressions of the meeting especially stick in our mind. Firstly, there is the lightness of touch with which at the opening meeting the Swiss hosts, Professor-Dr. Frey-Wyssling, Rector of the Swiss Federal Institute of Technology, who also spoke in the name of the Swiss Government, and Mr. G. F. Gruner, President of the Société Suisse des Ingenieurs et des Architectes welcomed the members. They maintained that lightness of touch in spite of the formidably formal atmosphere of the Main Auditory of the Institute in which they spoke. Members were made to feel very much at home. Their President, Mr. Desmond Carter, was careful to maintain the informal atmosphere in his reply. The social success of the meeting was assured from that time onwards. It was further emphasised at a reception the same evening. For the hosts, the Société and the Swiss Association of Machinery Manufacturers, laid on a delightful entertainment of Swiss traditional music sung by men and women in 'national' costume. Our second impression concerns certain works which we personally visited in company with many other members. At two of those works new shops were inspected. The new shop which Brown, Boveri and Co. is building at Birrfeld for the construction of large electrical machines really startled members. It is, in fact, at present at its most impressive stage—structurally almost complete, but still almost empty of the very large machine tools to be installed. At that stage industrial buildings always look "larger than life" and at Birrfeld nothing is lost by the fact that the buildings are on a green fields site. There is an equally impressive shop at Sulzer's Ober-Winterthur works. It is in full use. It is a steel and iron foundry capable of supplying all the firm's needs and those of several other Swiss concerns as well. Both these shops demonstrate the confidence of the Swiss in their ability to win orders for their products from all over the world.

There are, of course, equally impressive buildings in this country; so that there is no need for British engineers to acquire an inferiority complex. But it is also good that they should see what is happening on the Continent and realise what their competitors there are doing and are capable of doing. For if British engineering firms are to meet the competition of the Swiss, and others, in world markets for engineering products they cannot afford to rest on their laurels. Efforts will have to be made to improve designs and construction methods and to keep down costs. We cannot help wondering in that connection how many British trade union leaders really have much conception of what is going on abroad.

ATTRACTING BOYS TO BECOME ENGINEERS

Many firms and institutions have recently become interested in attracting young people to take up engineering as a career. They have issued booklets and pamphlets setting out the advantages and telling young people and their parents how to acquire the necessary education and what standards must be reached. One of the best publications we have seen of this kind has just been issued by the Institution of Municipal Engineers. It is primarily addressed to the boy who is just about to leave school and who is wondering what career he might take up; but a good many careers masters as well as parents (who may wish to assure themselves that their charges or their sons are choosing wisely) may be glad to get hold of a copy. Wisely those who compiled the pamphlet have chosen to illustrate it quite profusely. Boys are told, broadly, what municipal engineering is, how to judge whether they are cut out for the job, how to make a start in getting training, how much they can hope eventually to earn and how much they will earn to begin with and how the Institution can help. Some particulars of examinations are also mentioned.

The point that impresses us about this document is the way in which those who compiled it have perceived the need to produce something really attractive which a late-teenage boy will read and absorb. Too many other documents issued to serve a similar purpose provide, indeed, information in much more detail. But they make excessively dry reading. In reality we suppose documents of both characters are required. One, like that before us, should have as its aim the attraction of a boy to a particular career; the other, more solidly informative, should provide all the detail that parents and the boy himself will need once a career has been chosen.

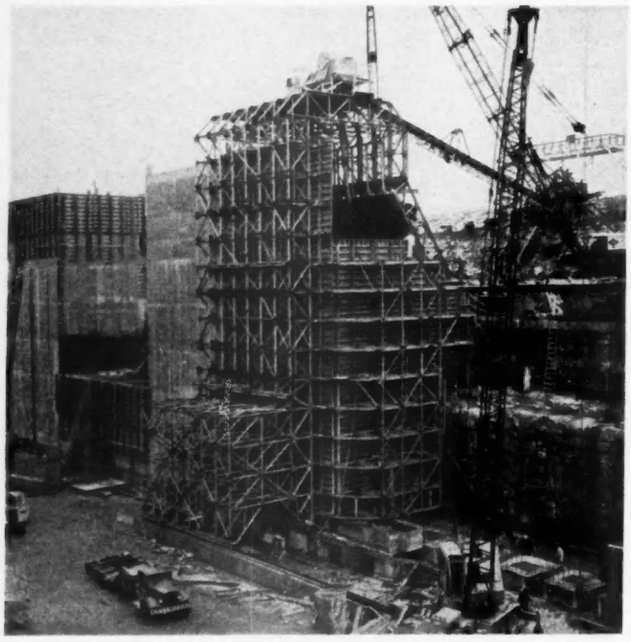
VISCOUNT WEIR OF EASTWOOD

The first Viscount Weir of Eastwood, whose death occurred on July 2 at the age of eighty-two, had a distinguished career as an engineer and industrialist. His close association with the Weir group of companies extended over sixty years, for he joined his family's engineering business in the closing years of last century. Although he retired four years ago from the chairmanship of the group, he continued to serve, as honorary president, until his death. But his ability was not applied only to directing the affairs of the group of companies which bears his name. Lord Weir's record of public service was equally impressive. During both world wars, he filled important Government offices concerned with munitions production and aircraft development. Then, too, there were numerous ways in which Lord Weir encouraged the work of the professional institutions. His generous gifts, in 1953, of £10,000 each, to the Institution of Mechanical Engineers, the Institution of Naval Architects, the Institute of Marine Engineers, the Institution of Engineers and Shipbuilders in Scotland and the North East Coast Institution of Engineers and Shipbuilders will long be remembered. The gifts were quite unconditional and were characteristic of a man who spent a long life in the engineering profession and in the service of society.

CONSTRUCTION AT BEAUHARNOIS LOCKS

Construction by cut-and-cover of the highway tunnel (LEFT) under the lower Beauharnois lock was one of the first works undertaken at this site. The next two illustrations show formwork for constructing the walls of the upper lock (RIGHT) and the lower lock (BELOW). The right-hand illustration is of shuttering made in this country by Acrow (Engineers), Ltd., which is unusually large and elaborate. This rail-mounted structure, which is over 100ft high, was used for all thirty of the monoliths in the main lock sections of the upper lock, handling in one lift an entire 82ft high monolith, 40ft wide and 38ft thick.

The formwork consisted of 12ft square panels carried on a travelling steel truss frame riding on one rail near the top of the rock excavation and two rails on the sill of the lock. The panels consist of ¾in plywood backed by steel channels adjusted and stripped by vertical and horizontal turnbuckles built into the main framework. The travelling frame, which was mounted on double-flanged steel wheels, was an all-bolted structure which lent itself to later modification for work on the main approach walls to the lock. It was anchored by four 2¾in diameter rods, approximately 45ft long, to the excavated rock wall at the lower level, and at a higher level by four similar rods, passing through the frame and clamping the two sides together. All rods were covered with stove piping.



Only one bulkhead was required because the formwork was always positioned against the previous monolith. The bulkhead was made in a similar fashion to the main formwork, but the large panels were backed with horizontal steel trusses. Vertical thrust was resisted by a 50-ton jack in a recess in the rock face. After each pour the bulkhead, which split into three sections, was handled by crane to the next position. Then the traveller was pulled into position by winches mounted on dozers, and the front and back face formwork panels aligned by turnbuckles. The large 2¾in tie bars were inserted and the bulkhead pinned along one edge to the traveller, the other edge being propped and wedged against the excavated rock wall.

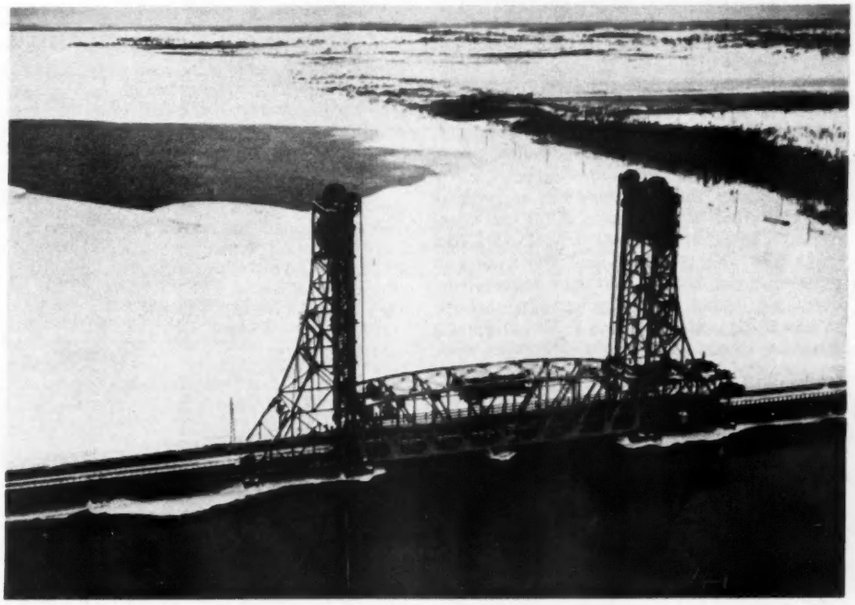
Concrete was mixed with a slump of 1½in, with 5·8 bags of cement per yard, and a maximum aggregate size of 3in. It was dumped from trucks into a hopper on top of the rock wall and belt-conveyed to the top of the form, where it was distributed through a bifurcated chute into two hoppers which led directly into elephant trunks. Another similar hopper and elephant trunk mounted on top of the form were fed by 4 yard buckets handled by a crane. Metal chutes suspended from the cranked portion of the main frame at the rock ledge level were also fed directly by trucks. A total build-up from 4ft to 5ft per hour was achieved with negligible deflections in the formwork.

When the concrete lift reached 25ft an eight-hour halt was required to allow shrinkage around the large culvert in the lock wall. At the 60ft level an hour's halt was necessary because of a gallery in the wall which has to be positioned and set. Otherwise the pour continued to the 82ft level without interruption. The contract schedule called for the construction of two monoliths per week, giving a day and a half to set up the form and a similar period to place the 3000 cubic yards in each monolith, compared with the normal figures of about twenty-one days for an 82ft lift when such walls are formed with conventional cantilever forms. Other advantages claimed for the Beauharnois formwork were its saving in manpower and its simpler heating qualities during the cold Canadian winters.

St. Lawrence River Development

VIII—The Beauharnois Locks

We continue to describe the Soulanges and Lake St. Francis sections. The former involved principally the construction of two locks beside Beauharnois power station, but the latter only dredging. Together, these two sections extend over 45 miles, and bring our description to the end of the purely Canadian length of the St. Lawrence Seaway.



Uninterrupted highway communication across the Beauharnois site was ensured in the first stage of the constructional work there, by completing the road tunnel shown in Fig. 28 *ante*. This tunnel was built by "cut and cover," and is of substantial reinforced concrete construction. Rail communication across the upper lock, however, necessitated construction of a timber trestle and diversion of the railway to it ; then, at a later stage, a second diversion on to a temporary bridge across the top of the lock ; and finally realignment across the new lifting bridge.

Another important ancillary work was the establishment—in an area to the west of the main works—of plant for handling crushing, and preparing the rock excavation for use as concrete aggregate, and for batching and mixing concrete. Three concrete plants were in production—one containing two 4-cubic yard mixers serving the contractor who built the lower lock ; one with three 2-cubic yard mixers serving the contractor for the upper lock ; and one with two 2-cubic yard mixers serving the Quebec Hydro Electric Commission's phase III works at Beauharnois power station, as described in Part-VI. These three plants were served by aggregate loading plant of 800 tons per hour capacity. Concrete was taken by truck to the three destinations ; for most of the constructional period an access road was left across the intermediate basin, and was excavated away at almost the last stage of the work.

Over 5,500,000 cubic yards of excavation was needed to complete the locks and intermediate basin. The rock excavated, known as Potsdam sandstone, fragmented easily and did not require large quantities of explosives (generally about half a pound per cubic yard). However, its hardness and highly abrasive nature caused great difficulty in all other respects, especially drilling. Churn drills were found to be the most effective, and were largely used. In the upper lock area, a faulted zone, containing around 200,000 yards of rock, caused particular difficulty. A jet piercer was used in this area. This device cuts a 6in hole by alternately exposing the rock to a high temperature flame and then quenching with water. It is reported that the Potsdam sandstone was so abrasive that bucket teeth of excavators had to be replaced after less than eight hours' working.

The lock inverts are of natural rock, and the side walls, as already shown, are of semi-gravity section. In the intermediate basin the walls are tied into the rock. Concreting of all these walls was done at high rates with elaborate rail-mounted shutters. The illustration at the foot of page 18 shows in use the three rail-mounted timber shuttering assemblies employed for construction of the lower lock. Each one was 50ft high by 40ft wide and weighed 33 tons. In use, it was jacked up 9in to give a vertical face for the actual concrete placing operation. Concrete was placed in two 25ft lifts, the construction joint being at the level of the culvert roof. Each of the forms was moved and prepared for its next position in about twelve hours. Finally the top 30ft of the lock wall was built in three lifts using conventional climbing shuttering. Concreting rates up to 100 cubic yards an hour were achieved at the lower lock.

Shutters for the walls of the upper lock were partly similar to those just described, but also for the approach walls and lock walls a rail-mounted steel shutter 80ft high was used. The width was again 40ft (the size of the monoliths) but in this case pouring was continuous, at a rate of 3ft per hour. This shutter is also shown in use on page 18, and in the drawing, Fig. 29.

A considerable area of reclamation has been won in Lake St. Louis on each side of the approach to the lower lock. During construction the approach was sealed off with a rock-fill cofferdam, the space thus enclosed being used as a casting yard for reinforced concrete caissons. The approach walls were built " in the dry," in the manner already described up to this cofferdam. On the Lake side, dredging was in progress, to complete the approach. On removal of the cofferdam, the caissons were floated out and positioned in dredged trenches, to complete the construction of the approach walls.

In the intermediate basin, construction was fairly straightforward. The weir which limits the upper level of this basin, is about 700ft long, and is set 4ft below the tops of the upstream mitre gates at the lower lock. A length of 12ft of this weir at its upstream end has been built 1ft 9in lower than the main section. The purpose of this section is to prevent water slopping over the main weir continuously, which in cold weather would build up an ice sheet on the weir and spillway channel.

At the upper lock conditions were rather more complicated than elsewhere on the site. The problem here has been concisely described by Messrs. Peckover and Tustin,§ and we cannot do better than reproduce a short abstract from their paper, as follows :

The Beauharnois power canal has been dredged since 1930 by successive stages, which has changed the ground water conditions in the area considerably, and introduced an unlimited source of water directly to the bedrock at a head some 12ft higher than the original water table. As a result, the blanket of soft marine clay overlying the bedrock in the vicinity of the canal is under artesian pressure from this fresh source of water below. Numerous test borings made prior to the start of the work at the upper lock site showed flows of water under artesian head. A braced and sheeted test pit was put down to bedrock in the approach area, a pumping test was done, and the effectiveness of sheet piling and grout in reducing the flow of water through the bedrock was noted. The sheet piling reduced seepage through a thin layer of coarse-grained till lying between the soft clay and bedrock and grouting reduced seepage through the rock but, even in combination, they were not effective to a satisfactory degree.

The general layout in this area is shown in

§ See reference in Part I.

Fig. 30 (*a*). First, a sheet pile wall was driven to rock along the canal dyke before the start of any excavation. This wall was not intended to reduce seepage but rather to strengthen the dyke to resist any piping which might develop. Initial excavation was then made, limited as shown on the plan to that necessary to build a barrier secure against the possibility of an accidental breaching of the canal dyke. This barrier consisted of a clay dyke, the approach wall, sheet pile cells across the future entrance for a twin lock, stop logs between the two present lock walls, and a steel sheet pile wall between the lock and the canal dyke. On completion of the barrier the remaining dry excavation was continued to safe limits inside the canal dyke. The excavation was then flooded, the sheet pile wall removed, and the dyke and remaining overburden and rock removed by dredging. This plan was carried through satisfactorily, but only with the most careful attention to changing conditions as the work progressed.

Of considerable help in dealing with changing ground water and soil conditions promptly and with adequate facilities was a special item included in the contract. This called for the supply of equipment and

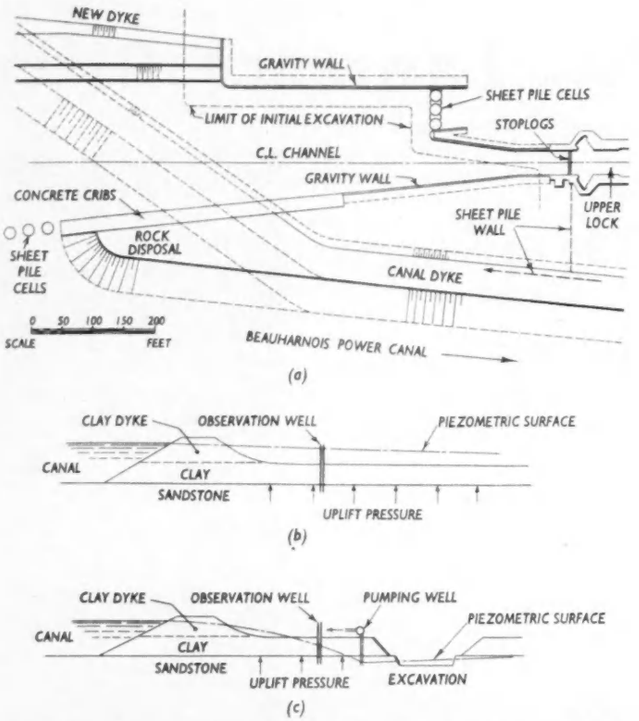


Fig. 30 Constructional procedure at upper end of upper lock. (a) general layout; (b) water table at lock site; (c) modified water table during construction

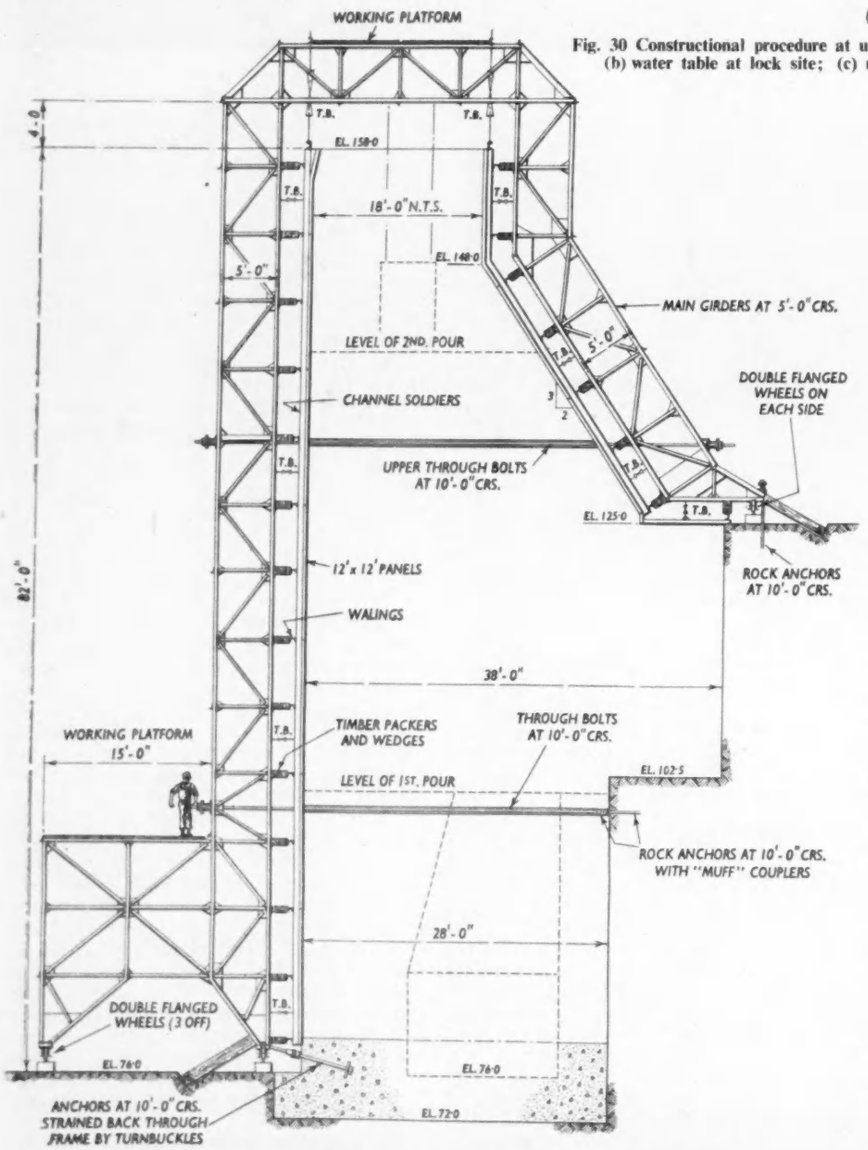


Fig. 29 Travelling formwork for continuous construction of 80 ft. high wall of lock

personnel to do drilling and sampling, drainage trench excavation, pumping, grouting and pile driving. This item was instrumental in promoting safety and avoiding delays in the work on many occasions.

The artesian head under the clay blanket at the start of the work was such that excavation to a depth of only 10ft over any appreciable area would cause uplift and rupture of the layer, with consequent possible piping through the canal dyke. These conditions are shown schematically in Fig. 30 (*b*). The first step in maintaining control of the ground water problem was the installation of a pattern of observation wells to enable pressures throughout the area to be checked at any time. These wells were maintained throughout the work and proved essential in evaluating each new development affecting the ground water.

The second step was drainage. The excavation was carried down to bedrock in one step. This was so that natural drainage could take place and reduce the uplift pressure ahead of the excavation face. The effect was assisted by drainage trenches dug in advance of the general excavation. This type of drainage was observed to have a far-reaching effect on the piezometric head, sufficient in itself to ensure against the possibilities of uplift and piping.

As the initial excavation proceeded west and approached the inner side of the canal dyke, it became necessary for safety to achieve a drawdown additional to that from natural drainage. Pumping was therefore started from three 12in wells, drilled into bedrock around the western perimeter of the excavation area. One of these wells proved to be particularly effective, due to its fortuitous location in a shattered bedrock formation supplying most of the water to the area. With a specific yield of 275 gallons per minute per foot of drawdown, this well produced a drawdown of 4ft at a distance of 250ft. It remained in continuous operation until the excavation was finally flooded in July, 1958.

When the permanent barrier was being constructed during the winter of 1957–58, ground water conditions were maintained, as shown schematically in Fig. 30 (*c*) with respect to the excavation slopes. The total flow into the excavation was steady at about 10,000 g.p.m. Between March and June, 1958, the clay and rock excavation in the remainder of the area was carried out. Each successive rock blast increased the flow of water noticeably until the total inflow was more than 30,000 g.p.m. This was finally turned to welcome advantage in flooding the area by simply stopping the pumps.

Lake St. Francis

Little need be said about the Lake St. Francis section, since only the dredging of shoals was necessary, though the total quantity of dredging in the lake was nearly 4,500,000 cubic yards. The lake is 29 miles long and extends over 90 square miles ; there is a drop in level of 1ft across its length. Crossing this section brings us to St. Regis Island, 75 miles from the Seaway entrance. Ahead lies Cornwall Island and the international section of the power and navigation projects, which will be described in subsequent articles.

All of the works described in this instalment were the responsibility of the chief engineer of the St. Lawrence Seaway Authority and his staff. The principal contractors concerned with the Soulanges and Lake St. Francis sections were as follows :

At Beauharnois locks : 1st stage construction at both locks—Atlas Winston, Ltd. ; lower lock and approaches and production of all concrete aggregate—Canit Construction, Ltd. ; upper lock and approaches—United Waterways Constructors, Ltd. (a consortium of four Montreal firms) ; lifting bridge superstructure at upper lock (Melocheville Bridge)—Bridge and Tank Company of Canada, Ltd.

The two new lifting bridges built across the navigation channel of the Beauharnois canal at St. Louis and Valleyfield were built by The Dominion Structural Steel Company, Ltd. One of them is shown in the heading illustration on page 19. Dredging in Lake St. Francis was done by Marine Industries, Ltd., McNamara Construction Company, Ltd., and the Canadian Dredge and Dock Company, Ltd.

(*To be continued*)

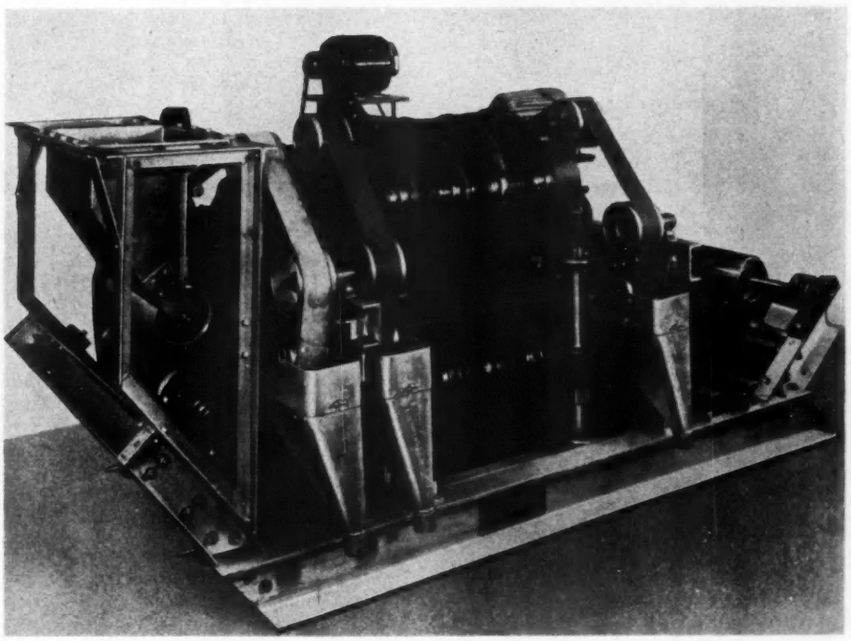
Magnetic Separator for Minerals

A MAGNETIC separator of cross-belt configuration has been manufactured for many years by the Fraser and Chalmers Engineering Works of The General Electric Company, Ltd., at Erith, Kent. It has recently been re-designed as a unit machine with two pairs of poles for removing the magnetic mineral and a single auxiliary pole for removing steel particles, &c., when required. The general design of the machine is shown in the accompanying illustrations. The construction is such that any number of units can readily be linked up in series.

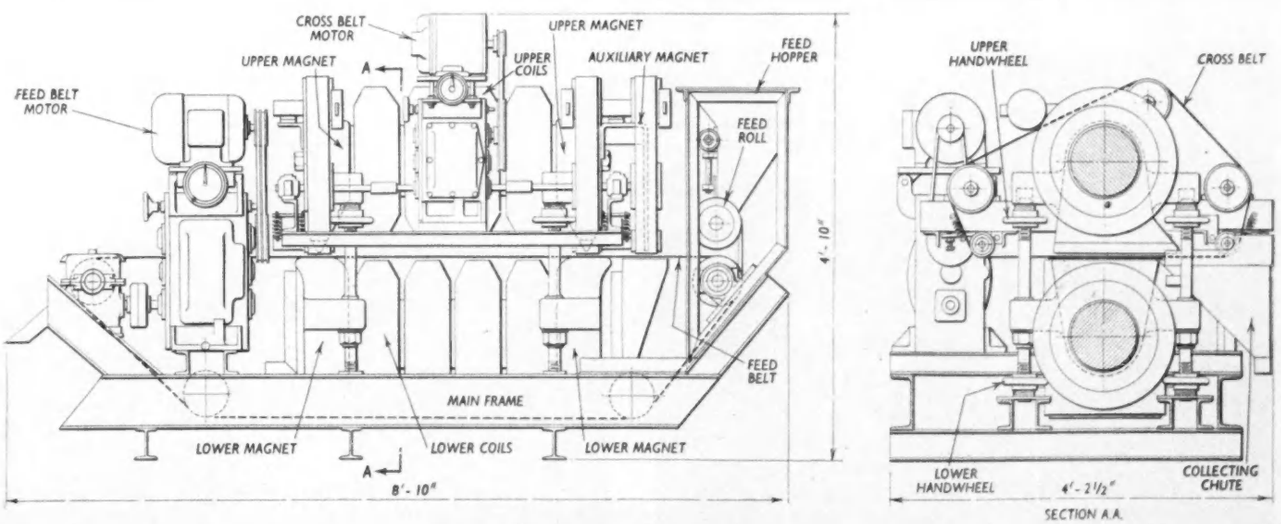
The magnetic flux is generated by eight coils, four on the upper magnet and four on the lower, designed to take a current of 3A at 110V d.c. A 15in feed belt carries the mineral through the air gap between each pair of poles. The upper poles are tapered and fitted with tips of high-permeability alloy to concentrate the lines of force at the pole tips.

The feed belt is driven by its own motor through a positive infinitely variable chain gear, which gives it a speed range from 20ft to 240ft per minute. The cross belts are driven by a separate motor through a variable-speed gear, and can be regulated between 250ft to 1000ft per minute. The upper poles of the magnet are carried on an assembly which is independent of the main frame and is supported on four posts with adjusting handwheels. The spacing between each pair of poles can thus be set accurately and independently to suit the mineral to be separated. Since the cross belts and their pulleys are mounted on the same assembly they do not have to be readjusted if it should be necessary to alter the air gap.

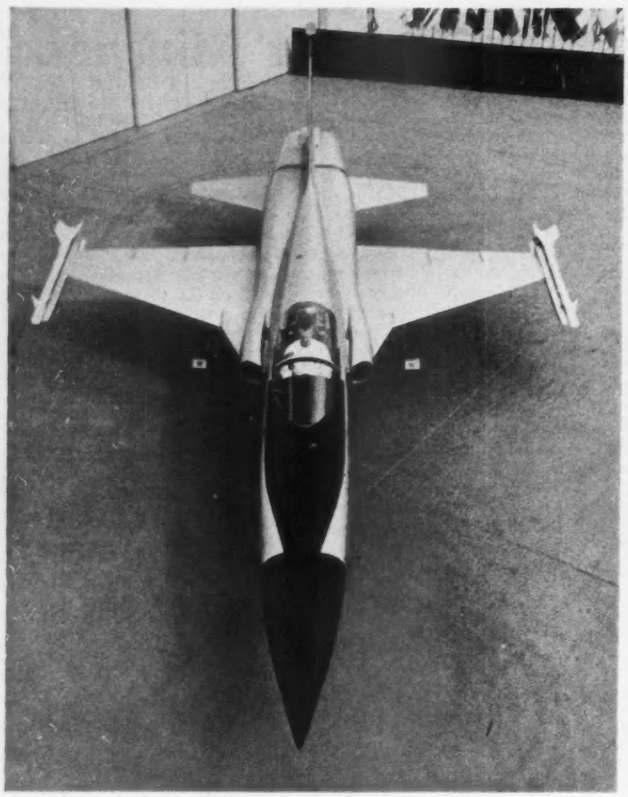
The framework of the machine, including the upper assembly, is of aluminium, while the posts and handwheels are of brass. Leakage of magnetic flux is this eliminated as far as practicable and virtually all the flux can be concentrated in the space between the poles. A field strength as high as 18,000 gauss is possible at belt level with a ¼in gap between the upper and lower poles. This concentration, combined with the converging field induced by the special pole tips, permits minerals of extremely low magnetic susceptibility to be separated.

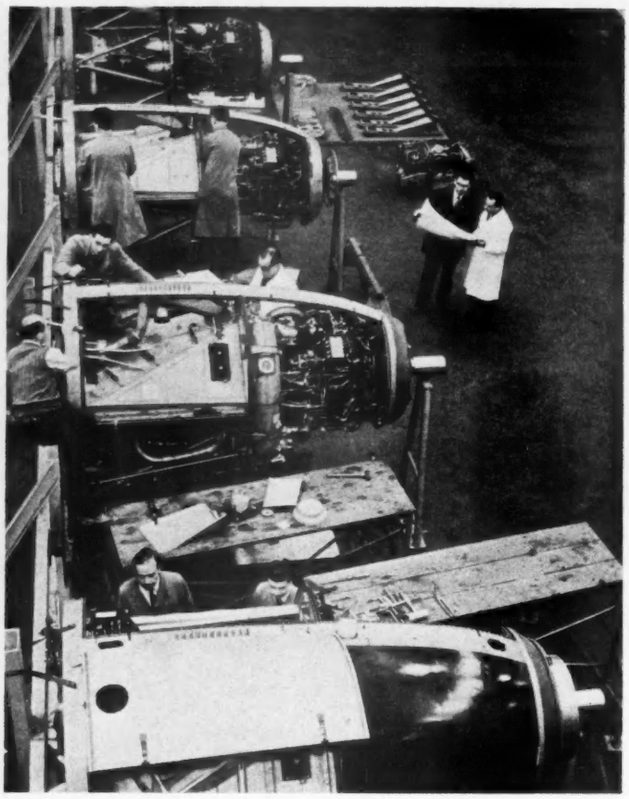


Cross-belt magnetic separator, with two pairs of magnetic poles for removing magnetic minerals and an auxiliary pole for removing iron or steel particles



General arrangement of cross-belt magnetic separator



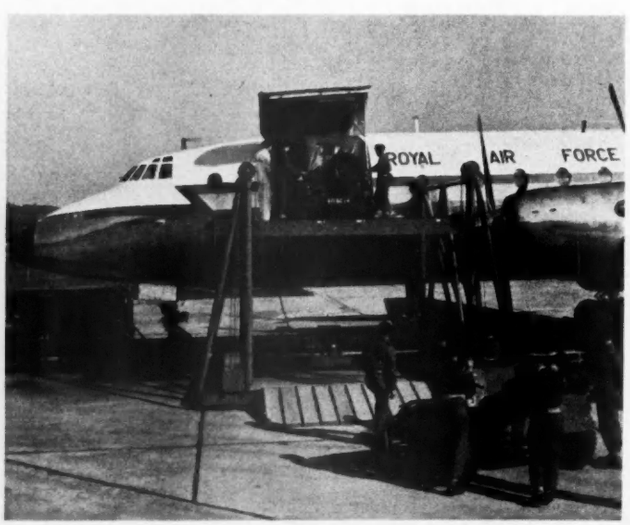


Aircraft Engines and Equipment

We illustrate (above, left) the prototype Northrop N-156F interceptor on the occasion of its formal roll-out. This project is founded on the realisation that for the nations of N.A.T.O. and S.E.A.T.O. the capital cost of a defence system is more important than the cost per kill, and that the capital cost is significantly reduced when the missile rather than the launcher is given extreme performance. The N-156F will attain Mach 2 only in its later versions, so that it is a relatively cheap interceptor aircraft, and it is also designed for maintenance with a minimum of both equipment and skill. It is seen armed with 'Sidewinder' passive homing weapons, which are used on all the Western fighters exceeding Mach 2, and are even capable of destroying a high velocity aircraft rocket. The jet engines, mounted outside the structure at the tail, may be Rolls-Royce RB-145 units.

Above (right) are seen power units in course of assembly for Canadair/Convair 540 airliners. These machines, respectively converted Convair-Liner 340 and 440 airframes and Canadian-built equivalents to the 'Metropolitan', use Napier 'Eland' 504 turbines of 3,500 h.p. each in place of Pratt and Whitney air-cooled radials of 2,500 h.p. each: the spaciousness of the cowlings designed for the reciprocating engines is conspicuous on the furthest engine. The turbines have air starters and a Blackburn-Turbomeca 'Palouste' auxiliary power plant may be carried to render the machine independent of ground facilities. This engine, designed to full airworthiness requirements, is also used in ground starting equipment: one is installed in the Commer 15-cwt. pick-up seen (below, left) preparing to start a Boeing 707-120 (Pratt and Whitney JT-3 engines). The power unit, complete in this case with a 60kVA alternator, is housed below the hinged panel seen secured with two spring latches—forward and aft of it are the intake and exhaust silencers. The engine and exhaust bays do not extend right across the vehicle, hoses being stowed on the starboard side.

Bristol 'Britannia' 253 aircraft of Royal Air Force Transport Command are to be provided with a freight lift that has been designed and built by Short Brothers and Harland. The lift, which will handle 12,000 lb. on a 14 ft. by 12 ft. platform, can be dismantled and stowed inside the aircraft in a space 4 ft. by 5 ft. by 19 ft.: assembly takes about twenty minutes. As illustrated below it is powered by an electric motor and requires a 10kW ground servicing trolley for its operation.



The diesel-electric tug "Cardon" seen with the monitors discharging during trials in the Clyde

Fire-Fighting Tugboat

There was recently completed by Lobnitz and Co. Ltd., of Renfrew, for Compagnia Shell de Venezuela the firefighting tug illustrated here. Named *Cardon*, it is intended for service at the company's Cardon Refinery on the Paraguana Peninsula: the primary requirement was for a fire-fighting vessel but, since very large powers can be employed in berthing a large tanker rapidly, the new craft was built to serve also as a tug, thus justifying her being continuously manned and ready to go to full power. The problems of developing power either at the fire pumps or the screw, and of matching the engines to the screw over a wide range of water speeds, have been met by adopting diesel-electric transmission.

Power is provided by a pair of turbo-charged intercooled Mirrlees engines, each coupled to a d.c. generator giving 420kW at 750 r.p.m. The transmission, for which the equipment was supplied by Metropolitan-Vickers Electrical Company Ltd., is arranged to run on a constant current of 700A; one or both of the main generators may be switched into circuit. The constant current characteristic of the generators is established by metadyne exciters, and the output voltage varies from 0 to 600V. In circuit with the generators may be connected one or both halves of the propulsion motor: since the armature current is constant, the torque will vary directly as the field current, and a speed-invariant constant-power characteristic is obtained by using another metadyne to derive a current varying inversely with shaft speed, with which the motor is excited. With the vessel stationary the design full power speed is 110 r.p.m., but on trials 1000 s.h.p. was developed at 120 r.p.m., for a bollard pull of 15 tons. The same power gave a propeller speed of 150 r.p.m. and a ship's speed of 12.75 knots when running free, but the constant power operation will normally be overridden to prevent the screw speed exceeding 140 r.p.m. There are two fire pumps, which with their control rheostats can be switched into the 700A. circuit, giving up to 3,300 gallons per minute at 150 lb. per sq. in.

To help in controlling the vessel when it is acted upon by the thrusts of the four monitors, and to improve the manoeuvrability at low powers, the tug is fitted with a 100 h.p. Pleuger activated rudder. The propeller speed is controlled by varying the alternator speed, reversing alone being effected electrically, and to obtain the desired speed range a six-cylinder Rolls-Royce high-speed diesel has been installed to drive the alternator. The rudder travel of ±90 deg. is limited to ±35 deg. at more than half ahead or astern on the main engines, and an alarm system is installed to enforce this. Main and Pleuger screws can be controlled directly from the bridge.

The welded hull has the following particulars: length overall, 114 ft.; length between perpendiculars, 107 ft.; breadth moulded, 29 ft.; depth moulded, 14 ft., and loaded mean draught, 11 ft. 3 in.

New 50-Centimetre Airport Radar

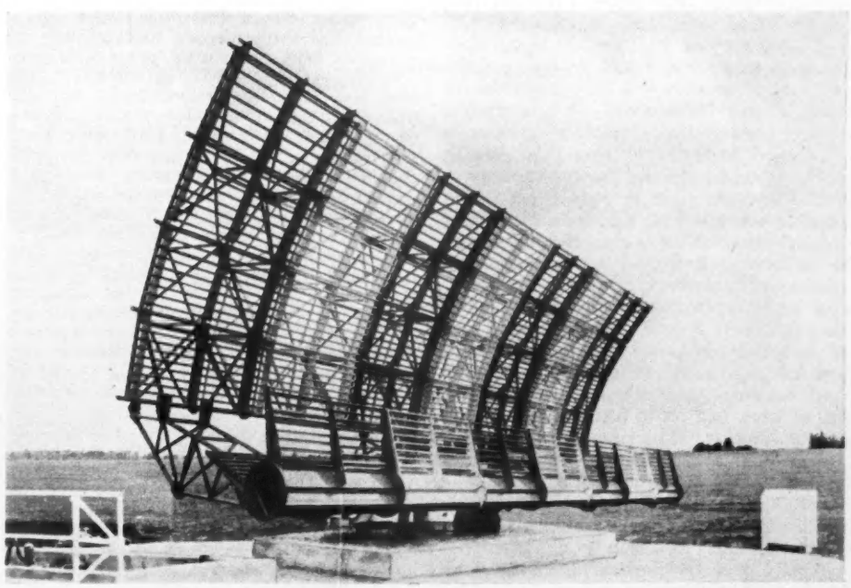
The first installation of a new series of 50-cm. radar equipments for airport surveillance was brought into service on June 26 at Jersey, when the inauguration was performed by Her Royal Highness Princess Margaret. The Jersey airport equipment has a peak power of 50kW and belongs to the S264 series developed by Marconi's Wireless Telegraph Company, Ltd., Chelmsford, to give improved performance in certain respects compared with the company's S232 series introduced in 1954. Improvements have been made in horizontal definition, vertical cover and overall performance, while retaining the use of the 50-cm. wavelength with its characteristics of longer range, negligible precipitation clutter, and ability to use crystal control of all stages. The stability obtained in this way is a major contribution to the effectiveness of the moving target indicator technique which, by discriminating between echoes from fixed and moving objects, enables permanent echoes to be erased from the screen for close-range plotting of aircraft.

The S264 radar has a new aerial system giving a horizontal beam width of 2.25 deg. and an increase in vertical aperture compared with the S232, making possible solid coverage to 100 nautical miles up to 40,000 ft. on a medium-size aircraft. A new and more powerful turning gear comprises twin 35 h.p., a.c. motors giving final rotational speeds of 10 and 5 r.p.m., the latter speed being obtainable in a 90-knot wind. Remote control of the aerial head (illustrated) and its associated transmitter and receiver is possible at up to 800 yards without, or 5000 yards with, amplifiers. Three desk-mounting P.P.I. displays are in use at Jersey Airport. They are of 12-in. diameter, edge-lit, and with an illuminated circumferential bearing scale. Video maps and range rings, and intertrace markers for identification of targets, are incorporated in the equipment.

A 500kW version of this equipment, the S264A, is scheduled for installation at London Airport and Ringway (Manchester). The S264 itself is expressly engineered to allow conversion from 50 to 500kW should circumstances call for it.

Permanent Way Institution

THE Permanent Way Institution held a convention in London from June 6 to June 11, to celebrate the seventy-fifth anniversary of its foundation. The institution was founded in 1884 by a group of permanent way officials to advance technical training and scientific knowledge, and particularly to promote the highest accuracy in fitting the permanent way of large railway centres and junctions. It has ever since promoted training, study and education among permanent way workers of all grades; holds meetings at twenty centres throughout the country and conducts examinations. At a Convention Reception at Stationers' Hall, London, in the afternoon of June 9, the chief guest was the Lord Mayor of London, Sir Harold Gillett, who was accompanied by the Lady Mayoress, the Sheriffs of the City of London and their ladies. They were received by the President of the Institution, Mr. C. E. Dunton, Chief Civil Engineer, London Transport. Sir Brian Robertson, Chairman of the British Transport Commission, was the principal guest at a dinner held at the Connaught Rooms.



Aerial head of new airport surveillance radar. Overall height, including turning gear, is approximately 15 ft. and the reflector is 52½ ft. long

Brit.I.R.E. Convention on Television

This year's convention of the British Institution of Radio Engineers, held in Cambridge from July 1 to 5, took the theme of "Television Engineering in Science, Industry and Broadcsting". The field covered by the eight sessions embraced many aspects of television in these fields, and it was appropriate that the first paper discussed examined the probable relative importance in future of industrial and entertainment equipment. This was a contribution entitled "Industrial Television: A Survey of History, Requirements and Applications," by J. E. H. Brace of Marconi's Wireless Telegraph Company, Ltd. The author suggested that progress in industrial television had been much slower than might have been expected from optimistic forecasts made some ten years ago. This branch of television had suffered from being a by-product of a well-established and prosperous entertainment business, and the use of unsuitable domestic quality components in early equipments had given industrial television a bad name for reliability. Generally speaking, it was only in the last two years that manufacturers and users had attempted to understand each others' problems and to rectify the initial mistakes. The situation was improving today because of the growing number of production engineers with electronics experience, and the quantity production of suitable valves and components, stimulated by interest in industrial computers, with the result that these parts were less costly than hitherto. Also, the armed forces were becoming important users of television and were encouraging the design of equipment to military standards. There was an increasing trend towards specialised equipment of entirely new conception which bore little resemblance to its broadcasting counterpart, and this trend could be expected to accelerate in future. It was thus already possible to foresee a relative decline in importance of the entertainment medium until it became subsidiary to its own offshoot.

A specialised application of industrial television treated in a separate paper was "The Application of Closed-Circuit Television in the Nuclear Industry", contributed by P. Barratt and I. M. Waters, both of Pye, Ltd., Cambridge. In their consideration of future developments, these authors said there was an increasing need for colour television in, for instance, hot laboratories for metallurgical study and processing, and less costly colour equipment to meet such requirements was now being evolved. The trend to higher temperatures in reactors made it apparent that cameras for on-load and after-shutdown inspection must become still more insensitive to their environment. Cooling systems must be studied further, but would be only a partial solution, and the thermal capacity of vital equipment must be reduced. To meet the radiation problem, the size and mass of material required for useful shielding would be prohibitive for many applications, and camera positioning would be a major problem. This might require reductions in number of components by improved circuit design and the design of new components. Any cameras intended to operate in a working reactor would become highly radioactive and a great deal of work had yet to be done to facilitate remote servicing. The increasing numbers of boiling water and pressurised water reactors would produce a demand for underwater television cameras, at least for in-pile inspection during shut-down. Regarding size requirements for television equipment, the diameters of a few inches which could be achieved with cylindrical cameras should be adequate in the immediate future and reduction of length was probably the next step.

Glandless Circulating Pump

The Harland Engineering Company, Ltd., of Alloa, Scotland, and Timperley, Cheshire, is now making a glandless circulating pump specially designed for use in forced circulation, small bore central heating systems. The "Kalorite" pump, as it is known, is designed to be noiseless in operation and to run continuously. It is made in a number of sizes to handle from 1 to 160 g.p.m. and for heads up to 26ft. In the pumps the rotor of the electric motor is separated from the stator by a "can" of non-magnetic stainless steel. This can forms a seal, so that the rotor runs in the water being pumped whilst the stator remains dry. No glands or stuffing-boxes are needed to keep water out of the motor, and as the rotor runs in water, no lubrication is necessary for the pump.

All of the pumps have motors wound for three phase supply, the smaller units being designed for connection to single phase supply of 200V/250V, 50 c/s by incorporating condensers; and the larger units for three phase supply of 100V/440V, 50 c/s. Two condensers are fitted,

Glandless circulating pump for forced-circulation, small-bore hot water heating systems

one for starting and one for running. The starting condenser cuts out automatically when the pump is running, leaving the other condenser to maintain correct phase balance.

Epoxy Resins in Road Surfacing

News from the Shell Chemical Company of a development in road surfacing is at first sight a surprising one since epoxy resins, which are among the most expensive of the synthetic resins on the market, are being employed in competition with low-priced conventional road surfacing materials. It is on account of the special properties of the resins, the company states, particularly their adhesion and toughness, that they were chosen for this new development. Basically, it consists of applying to road surfaces a thin layer of a composition comprising "Epikote" resin, a curing agent and a filler. This layer, which in many cases is only ¼ in. thick, is stated to have remarkable wear resistance and a skid-free surface, resisant to the effects of weather, petrol, oils and any chemicals that may be used for de-icing.

The applications where it is expected that these new surfacing materials will find acceptance may be considered generally as special regions of unusually severe usage, for instance where oil spillage occurs, or where vehicles are continually braking or starting (such as at a bus stop). Other applications expected are on bridge decks where weight saving is important, in places where skidding is a serious hazard, at pedestrian crossings, or for road-marking compositions, and for re-surfacing roads in cities where the use of a thin layer avoids either taking up the surface or raising manholes. The Shell Chemical Company is now undertaking a series of tests in this country using compositions which have been developed in the United States over the past four years.

Appointments

MR. W. A. G. BRIAN has been appointed secretary/accountant of Marconi Instruments Ltd.

CAPTAIN NORMAN WILLCOCK has been appointed marine superintendent for the Union-Castle Line.

BRISTOL SIDDELEY ENGINES LTD., announces that Air Commodore F. R. Banks has relinquished the post of sales director and has retired from the board of the company. Mr. W. H. Rees has been appointed general sales manager.

THE MINISTRY OF POWER announces that Sir Kenneth Hague, M.I.Mech.E., M.I.E.E., deputy chairman of Babcock and Wilcox Ltd., has been appointed as a part-time member of the Iron and Steel Board.

SIEMENS EDISON SWAN LTD., has announced that Mr. F. Booth has been appointed chief engineer to the accumulators and batteries division, Ponders End, Middlesex, in succession to Mr. H. S. Greenough whose services will be available in a consultative capacity for a period of twelve months.

THE GENERAL ELECTRIC CO., LTD., announces that Mr. T. W. Heather and Mr. R. E. Robinson, assistant managing directors, and Sir Patrick Ashley Cooper, a director, wish to retire in the present financial year. Mr. A. L. G. Lindley has been appointed vice-chairman and a managing director of the company.

APPLEBY-FRODINGHAM STEEL COMPANY, a branch of The United Steel Companies Ltd., announces that Mr. A. Howard has been appointed assistant to Dr. L. Reeve, chief metallurgist, with the title of research manager. Mr. E. E. Clark has been appointed works metallurgist and will be responsible directly to Dr. Reeve.

MR. H. L. COOPER has relinquished his positions as chairman and director of the Mond Nickel Co., Ltd., and Henry Wiggin and Co., Ltd., and has been succeeded by Mr. G. Archer. Three managing directors of Mond Nickel have been appointed: Mr. I. A. Bailey (operations), Dr. L. B. Pfeil (research and technical) and Mr. J. O. Hitchcock (commercial). Mr. Bailey continues as managing director of Wiggin and Messrs. Pfeil and Hitchcock continue as directors of that company. Dr. A. G. Ramsay has been appointed a director of Henry Wiggin and Mr. F. Dickinson has been appointed a director of Mond Nickel.

INDIAN STEELWORKS CONSTRUCTION CO., LTD., announces that Mr. R. G. Orgill, A.M.I.C.E., has been appointed as agent for the Davy-United sections of the Durgapur contract.

MR. JOHN F. PERRY has been appointed deputy chairman of Eutectic Welding Alloys Co., Ltd.

Business Announcements

MR. JOHN MASON has retired after fifty-three years' service with James Beresford and Son Ltd.

MR. ERNEST CROSSE has relinquished his position as an executive director of J. Brockhouse and Co., Ltd., having reached retirement age.

SOUTHERN INSTRUMENTS LTD., Camberley, announces that its analytical instruments department has appointed A. R. Bolton and Co., of Edinburgh, as its sole distributor for Scotland.

SOLUS-SCHALL LTD., 15–18 Clipstone Street, Great Portland Street, London, W.1, states that its telephone number has been changed to Museum 5080.

SMITHS AVIATION DIVISION, announces that the offices of its executive management of technical sales and services and of the accounts and commercial departments have been transferred from Cricklewood to Kelvin House, Wembley Park Drive, Wembley, Middlesex (telephone Wembley 8888).

JOHN LYSAGHT (SERVICES) LTD., states that the entire activities of the steel sheet sales department of John Lysaght's Bristol Works Ltd., have been transferred to John Lysaght (Services) Ltd., Swan House, 34–35 Queen Street, London, E.C.4.

BRITISH MONORAIL LTD., Brighouse, Yorkshire, and American MonoRail Co., Cleveland, Ohio, U.S.A., have concluded new technical liaison and licensing agreements. British MonoRail Ltd., is now able to offer a complete overhead materials handling system in conjunction with the products of Herbert Morris Ltd.

URWICK, ORR AND PARTNERS LTD., has opened an office at Trafalgar House, Collingwood Street, Newcastle upon Tyne, 1 (telephone Newcastle 26926).

Contracts

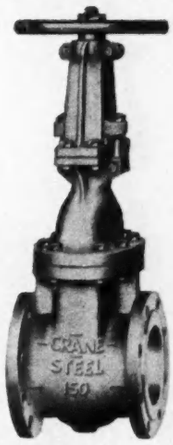
FERRANTI LTD. has received an order from the Central Electricity Generating Board worth about £385,000 for two 310MVA, 275kV three-phase, 50 c/s double-wound transformers for installation at Blyth 'B' Power Station, Northumberland. They will be water-cooled units and equipped with Ferranti resistor type on-load tap changers. The consulting engineers are Merz and McLellan.

RUSTYFA LTD. has signed a contract with Masinimport of Bucharest for the design and supply of machinery and equipment for a tyre factory to be built in Roumania. Dunlop Advisory Service Ltd. is acting as consultant for the project which involves a total expenditure in this country of more than £7,500,000.

ONCE AGAIN VALVES BY CRANE

The new plant of The International Synthetic Rubber Company Ltd. at Hythe on Southampton Water is now in production in a big way. Once again Crane valves are playing an important part. The illustration *left* shows the recovery building, where the steam lines to the Styrene Strippers have been fitted with Crane 12 inch, 10 inch and 6 inch cast steel gate valves. In the administrative buildings too, Crane equipment is used, the central heating and domestic installations being very largely fitted with Crane Bronze Globe and Gate Valves. More and more industries are discovering that the name of Crane is synonymous with dependability.

INSTALLING ENGINEERS:
Matthew Hall & Co. Ltd., London



One of the valves used—the 47X in cast steel, with end connections to British as well as American Standards. Can be trimmed to suit a variety of services for high and low pressures and temperatures.

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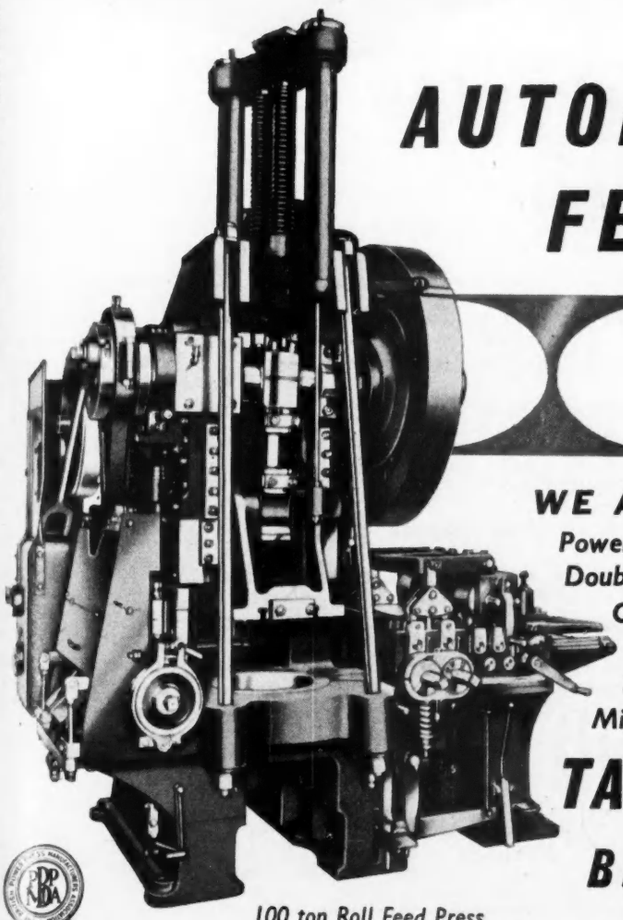
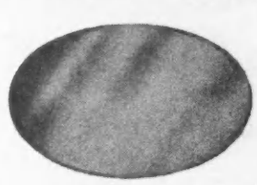


AUTOMATIC FEED PRESSES



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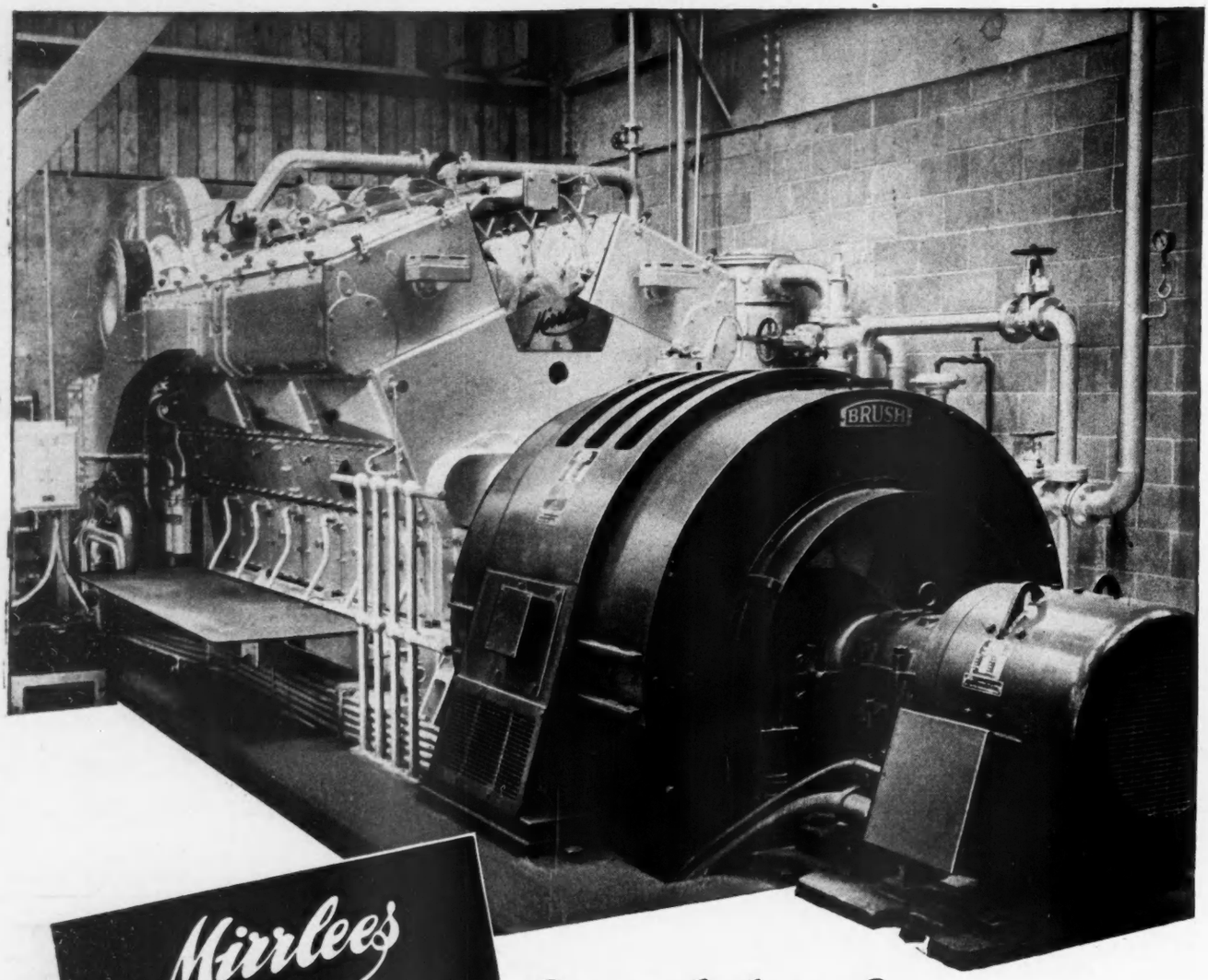

Mirrlees diesels

Stand-by for Uranium . . .

Where two years ago there was only virgin Canadian forest, there now extends the great Consolidated Dennison Uranium Mine, a 45,000,000 dollar enterprise and the largest uranium mine in the world.

As a safeguard against failure of the hydro electric power supply to a vital part of the plant (the stoppage of which would necessitate a lengthy shutdown) this Mirrlees JVSS12 engine and Brush generator have been installed; within twenty seconds the diesel plant starts automatically and reaches full power, taking over the load and preventing a costly shutdown.

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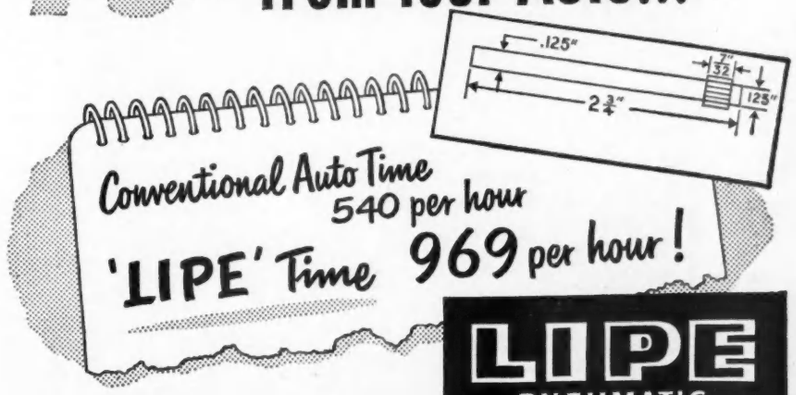

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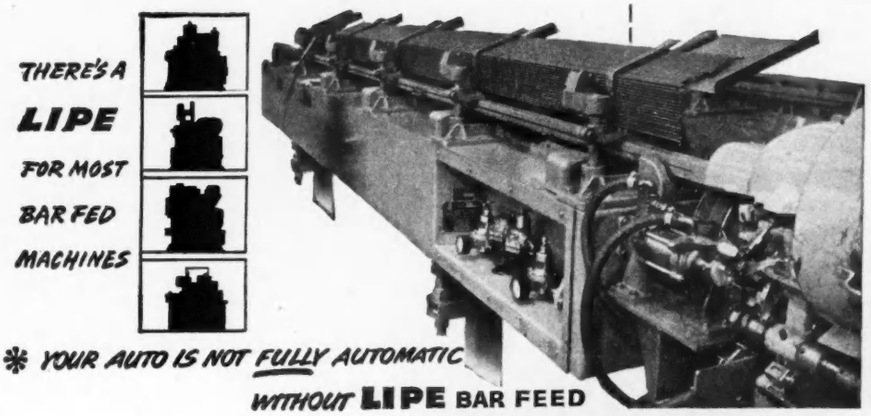

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COLES 2½ Ton EMA MOBILE. 16ft. Jib. Perkins engine. Pneumatics. £1050.
ANDERSON GRICE 3-ton Electric DERRICK 120ft. Jib. S.L.I. £1500.
JONES 4-ton KL44 MOBILE 24ft. Jib. Ruston Diesel. Pneumatics. 1953/4. £2550.
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